## REMARKS

This Amendment is in response to the Office Action dated December 19, 2002. Claims 1-43 are pending. Claims 1-7, 14, 15, 17-25, 32, 33, and 35-43 are rejected. Claims 1, 2, 4, 7, 8, 10, 14-17, 19, 20, 22, 25, 26, 28, 32-35, and 37-43 have been amended. Claims 8-13, 16, 26-31, and 34 are objected to. Accordingly, claims 1-43 remain pending in the present application.

Figures 2B, 10, 12, and 15 are objected to by the Examiner. Applicant hereby submits corrected drawings for these Figures. Pursuant to §1.85, corrected figures (with changes in red) are attached hereto. The Examiner's objection is thus traversed.

The Specification is objected by the Examiner for informalities. Applicant hereby amends the various paragraphs set forth by the Examiner to correct the informalities. The Examiner's objection is thus traversed.

Claims 1, 2, 15, 17, 20, 33, 35, 37, and 38 are objected to by the Examiner for informalities. Applicant hereby amends claims 1, 2, 15, 17, 20, 33, 35, 37, and 38 to correct the informalities. The Examiner's objection is thus traversed.

Claims 1, 4, 17-19, 22, and 35-42 are rejected under 35 USC 102(b) as being anticipated by Natarajan (USPN 5,742,592). The Examiner states:

> Per claims 1, 39, and 41, Natarajan teaches a method for media delivery in a network, comprising the steps of:
> -determining an available bandwidth for file transmission (non-real time service) for a time interval (time slot) (col. 3, lines 42-67 – col. 4, lines 28-34); and
> -(claim 1 only) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth (col. 4, lines 9-16);
> -(claim 39 only) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth (col. 4, lines 9-16), wherein the at least one file transmission task for each time interval is scheduled back-to-back (any remaining slots of the total slots requested by each user that were not processed in the preceding frame is scheduled for process in the following frame, col. 6, lines 11-19 and 31-42);
> -(claim 41 only) allocating at least a portion of the available bandwidth to at least one file

transmission task, wherein each of the at least one transmission task may be allocated a different amount of the available bandwidth (col. 4, lines 9-16), wherein the allocated available bandwidth varies as a polynomial in time (the requested amount of bandwidth as a function of time is known throughout the time interval the request spans, col. 6, lines 11-19)...

Per claim 37, Natarajan teaches a method for media delivery in a network, comprising the steps of:
-initializing a GSF (T(k)) (col. 3, lines 42-45 and col. 4, line 6);
-updating the GSF (N(k+1)) based upon bandwidth requirements for a plurality of LVS jobs (C(k+1) and V(k+1)) for a time interval (col. 4, lines 28-34);
-determining a size of at least one file transmission task (Alloc (I,k)) which can be transmitted during the time interval based upon the updated GSF (col. 4, lines 16-25); and
-allocating at least a portion of the updated GSF to at least one file transmission task based upon the size and an allocation strategy (a predetermined allocation scheme based on priority), wherein each of the at least one transmission task may be allocated a different amount of bandwidth (col. 5, lines 43 – col. 6, lines 1-54).

Claims 19, 22, 35-36, 38, 40, and 42 are computer readable medium with program instructions claims corresponding to method for media delivery in a network claims 1, 4, 17-18, 37, 39, and 41, respectively, and are rejected for the same reason set forth in the rejection of claims 1, 4, 17-18, 37, 39, and 41, respectively.

Applicant respectfully disagrees. The present invention, as recited in amended independent claims 1, 19, and 37-42, provide a method and computer readable medium with program instructions for media delivery in a network, comprising: determining an available bandwidth for completion of a file transmission for a time interval; and allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth.

In the preferred embodiment, this time interval is defined as the current time plus the maximum duration for any one file transmission task. If a sufficient amount of bandwidth will be available on the transponder for long enough to complete at least one file transmission task, then at least a portion of the available bandwidth is allocated to the at least one file transmission task. (See Specification generally, and particularly at p. 7, lines 1-8, and at p. 12, lines 2-7)

In contrast, Natarajan discloses a method and apparatus for allocating shared bandwidth

among a plurality of users by allocating a number of slots in a frame among the users. (Col. 3, line 3 – Col. 4, line 38) The Examiner argues that T(k) teaches the claimed time interval. Applicant respectfully disagrees. T(k) in Natarajan is the total number of slots in Frame K. (Col. 3, line 41) The number of slots requested by all of the users of a defined group is determined, and an allocation routine or procedure is utilized to allocate a number of slots in the subframe to each user of the defined group. (Col. 5, lines 56-61)

However, the time interval in accordance with the present invention is the time for the completion of a file transmission, not slots in a frame. In Natarajan, to complete a file transmission, many slots in many frames would be required. Thus, Natarajan teaches allocation based upon control over slots in the frame, while the present invention recites allocation based upon a time for completion of a file transmission. In fact, the total number of slots required to complete a file transmission in Natarajan is not known at the time of the slot allocations, thus, allocation based upon a time for completion of the file transmission is not possible.

Therefore, Natarajan does not teach or suggest the combination of determining an available bandwidth for completion of a file transmission for a time interval, and allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one transmission task may be allocated a different amount of available bandwidth, as recited in amended independent claims 1, 19, and 37-42 of the present invention.

In addition, per amended independent claims 37 and 38, Applicant respectfully disagrees with the Examiner that T(k) in Natarajan is analogous to the global step function (GSF) in accordance with the present invention. The recited GSF represents a total maximum bandwidth available in the network in a time interval for completion of a file transmission. In contrast, T(k) in Natarajan represents the total number of slots in a frame and does not address a total maximum bandwidth as claimed.

Therefore, Natarajan further does not teach or suggest initializing a global step function (GSF), wherein the GSF represents a total maximum bandwidth available in the network in a time interval for completion of a file transmission, in combination with the other element as recited in amended independent claims 37 and 38 of the present invention.

Claims 2-3 and 20-21 are rejected under 35 USC 103(a) as being unpatentable over Natarajan in view of Jamoussi et al. (USPN 6,128,280). Claims 5-7 and 23-25 are rejected under 35 USC 103(a) as being unpatentable over Natarajan in view of Jamoussi.

Claims 2-3 and 5-7 depend upon amended independent claim 1. Claims 20-21 and 23-25 depend upon amended independent claim 19. Applicant submits that claims 2-3, 5-7 and 20-21, 23-25 are patentable when read in combination with their respective independent claims 1 and 19, respectively. Applicant's arguments concerning Natarajan as applied to claims 1 and 19 apply here with equal force. Thus, even if Jamoussi teaches the limitations as argued by the Examiner, Natarajan in view of Jamoussi still does not teach or suggest the combination of determining an available bandwidth for completion of a file transmission for a time interval, and allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one transmission task may be allocated a different amount of available bandwidth, as recited in the combination of claims 1 with 2-3 and with 5-7, and 19 with 20-21 and with 23-25 of the present invention.

Claims 14-15, 32-33, and 43 are rejected under 35 USC 103(a) as being unpatentable over Natarajan in view of Caldara et al. (USPN 5,748,629). The Examiner states:

> ...Per claim 43, Natarajan teaches a system, comprising:
> -a server (a microcomputer), comprising a manager (an allocation routine) for file transmissions via a satellite transponder (a wireless communications link interface), wherein the manager comprises a bandwidth allocation scheduler (a scheduler), the bandwidth allocation scheduler capable of allocating a different amount of an available bandwidth to each of a plurality of tile transmission tasks (non-real time traffic, data sources) (Fig. 1, col. 2, lines 7-19 and 64 – col. 3, lines 1-4, and 38-67, and col. 5, lines 43-61).

However, Natarajan does not teach a database table.

Caldara et al. teaches a database table (a Switch Allocation Table) comprising information required by the manager for file transmissions (col. 6, lines 18-21).

Given the teaching of Caldara et al., it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate a database table into the system of Natarajan to manage the allocated bandwidth as taught by Caldara et al. (col. 6, lines 18-1)...

Applicant respectfully disagrees. Claims 14-15 depend upon amended independent claim 1. Claims 32-33 depend upon amended independent claim 19. Applicant submits that claims 14-15 and 32-33 are patentable when read in combination with their respective independent claims 1 and 19, respectively. Applicant's arguments concerning Natarajan as applied to claims 1 and 19 apply here with equal force. Thus, even if Caldara teaches the limitations as argued by the Examiner, Natarajan in view of Caldara still does not teach or suggest the combination of determining an available bandwidth for completion of a file transmission for a time interval, and allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one transmission task may be allocated a different amount of available bandwidth, as recited in the combination of claims 1 with 14-15, and 19 with 32-33 of the present invention.

Applicant submits that amended independent claim 43 is allowable for at least the reasons set forth in Applicant's arguments concerning Natarajan as applied to claims 1 and 19 above. For the sake of brevity, these arguments will not be repeated. Thus, even if Caldara teaches the limitations as argued by the Examiner, Natarajan in view of Caldara still does not teach or suggest a server, comprising a manager for file transmissions via a satellite transponder, wherein the manager comprises a bandwidth allocation scheduler, the bandwidth allocation scheduler capable of determining an available bandwidth for completion of a file transmission for a time interval, and allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein a different amount of available bandwidth may be allocated to each of a plurality of

fie transmission tasks, as recited in claim 43 of the present invention.

Claims 8-13, 16, 26-31, and 34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Accordingly, Applicant amends claims 8, 10, 16, 26, 28, and 34.

Claim 8 has been amended to recite the limitations of claims 1, 4, 5, and 8. Applicant submits that claim 9 is allowable because it depends upon allowable amended base claim 8.

Claim 10 has been amended to recite the limitations of claims 1 and 10. Applicant submits that claims 11, 12, and 13 are allowable because they depend upon allowable amended base claim 10.

Claim 16 has been amended to recite the limitations of claims 1, 14, 15, and 16.

Claim 26 has been amended to recite the limitations of claims 19, 22, 23, and 26. Applicant submits that claim 27 is allowable because it depends upon allowable amended base claim 26.

Claim 28 has been amended to recite the limitations of claims 19 and 28. Applicant submits that claims 29, 30, and 31 are allowable because they depend upon allowable amended base claim 28.

Claim 34 has been amended to recite the limitations of claims 19, 32, 33, and 34.

Therefore, for the above identified reasons, the present invention as recited in independent claims 1, 8, 10, 16, 19, 26, 28, 34, and 37-43 is neither taught nor suggested by the cited references. Applicant further submits that claims 2-7, 9, 11-15, 17-18, 20-25, 27, 29-33, and 35-36 are also allowable because they depend on the above allowable base claims.

In view of the foregoing, Applicant submits that claims 1-43 are patentable over the cited references. Applicant, therefore, respectfully requests reconsideration and allowance of the claims as now presented.

The prior art made of record and not relied upon has been reviewed and does not appear to be any more relevant than the applied references.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned **"Version with markings to show changes made"**.

Applicants' attorney believes this application in condition for allowance. Should any unresolved issues remain, Examiner is invited to call Applicants' attorney at the telephone number indicated below.

Respectfully submitted,

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## VERSION WITH MARKINGS TO SHOW CHANGES MADE

### IN THE SPECIFICATION

The Abstract has been amended as follows:

The present invention provides a method and system for providing a bandwidth allocation scheduler for media delivery. The present invention includes determining an available bandwidth for file transmission for a time interval, and allocating at least a portion of the available bandwidth to at least one file transmission task, wherein a different amount of the available bandwidth may be allocated to each of the at least one file transmission tasks. The bandwidth allocation scheduler in accordance with the present invention comprises a set of program segments that provides fast, deterministic real-time scheduling for the allocation of bandwidth for file transmissions. It allows the bandwidth allocated to a delivery to vary according to the amount of bandwidth available. A different amount of bandwidth may be allocated to each individual file transmission task[s]. Higher priority transmissions may be allocated bandwidth before allocation to lower priority file transmissions. The maximum bit rate of the slowest addressed receiver may be considered in allocating the bandwidth. Moreover, the customer can choose between different allocation strategies. Thus, the bandwidth allocation scheduler in accordance with the present invention reduces waste in bandwidth in media delivery, which in turn reduces costs for a customer.

The paragraph at p. 1, line 8 has been amended as follows:

Figure 1 illustrates a conventional satellite communications network 100 which is used to transmit data from a terrestrial sender 110, located at the "central site" 102, via the satellite 118 to a

number of receivers [110] 112-116 at "remote sites" 104-108. The transmitted data may be binary encoded files or some other file format. The network 100 includes the central site 102, the associated satellite transponder 110, the satellite 118, and the remote sites 104, 106, 108, with their respective receivers 112, 114, 116. Only three remote sites are shown in Figure 1, however, a typical satellite communications network may transmit data to thousands of receivers. A customer of the network 100 purchases a certain amount of bandwidth on the satellite transponder 110, typically for extended periods of time. E.g., a customer might lease bandwidth in the amount of 10 Mega bits per second (Mbps) on a transponder with a total capacity of 36 Mbps, for one or several months at a time.

The paragraph at p. 1 line 17 has been amended as follows:

Typically, a customer will transmit files from his/her central site 102 to one, some, or all remote sites 104-108, as soon as the file is available for transmission, and typically, all file transmissions are made at a fixed bandwidth. The bandwidth setting can be limited from above, by (A) the remaining available bandwidth on the transponder 110, given that on some systems, more than one file can be transmitted simultaneously from one transponder to (typically) disjunct sets of receivers, by (B) the maximum receive bit rate of the slowest receivers 112-116 addressed by the file transmission in question and by (C), maximum encoding rates of forward error correction equipment. The bandwidth setting for any one file transmission may also have to be limited from below, because most files have a Latest Delivery Time (LTD), i.e., the deadline by which the customer wants the file received correctly by all addressed remote sites. Missing that deadline would imply financial loss to the customer, and may make a file transmission obsolete. However, setting the bandwidth for all file transmission slow enough to accommodate the slowest receiver addressed by a particular transmission, will often place an unnecessarily restrictive upper limit on

the bandwidth from many other file transmissions, which may not address the slowest receiver in the first transmission.

The paragraph at p. 6, lines 14 has been amended as follows:

Figures 2A and 2B illustrate a preferred embodiment of a network in accordance with a method and system of the present invention. As illustrated in Figure 2A, the network 200 comprises a central site 202 and remote sites 204. At the central site 202 is a satellite transponder 210 which transmits data to the satellite 208 for delivery to all addressed receivers 206. Each receiver 206 has its own maximum bit transfer rate. For example, the central site 202 may be the headquarters for a retail chain while the remote sites 204 are the retail stores located around the world. The retail chain is thus the customer of the network 200, purchasing a certain amount of bandwidth on the satellite transponder 210. As illustrated in Figure 2B, the central site 202 comprises a server 212, which further comprises a software called Uplink 214, which manages file transmissions via the satellite transponder 210. Uplink 214 includes an Uplink Bandwidth Scheduler 216 (UBS). The UBS 216 is a set of program segments, or functions, that [are] is invoked by Uplink 214 for fast, deterministic real-time scheduling for the allocation of bandwidth for file transmissions. The UBS 216 allocates bandwidth based upon the total available bandwidth available for file transmissions, the allocation strategy indicated by the customer, the delivery deadline of each file, and the sizes of the files waiting for transmission. Uplink 214 obtains necessary system configuration parameters and other information needed for bandwidth allocation from database tables 218.

The paragraph at p. 7, line 14 has been amended as follows:

(1) The total available bandwidth of the satellite transponder 210 used for file

transmissions must be shared with bandwidth allocations for [life] live video streams (LVS). In the preferred embodiment, LVS jobs are given higher priority than file transmissions.

The paragraph at p. 15, line 21 has been amended as follows:

Under the Maximum Possible Bandwidth strategy, the Allocation Request function begins with the highest bandwidth for the GSF, *BW(0)*. For this bandwidth, the transmission lasts from *X(0)* to *t(0)*. However, during this time period, the available bandwidth drops below *BW(0)* at *X(1)*[, *X(4)*,] and *X(5)*, [all] both before the transmission would end at *t(0)*. Thus, *BW(0)* cannot be allocated to the file transmission task.

**IN THE CLAIMS**

Claims 1, 2, 4, 7, 8, 10, 14-17, 19, 20, 22, 25, 26, 28, 32-35, and 37-43 have been amended as follows:

1. (Amended) A method for media delivery in a network, comprising the steps of:

(a) determining an available bandwidth for completion of a file transmission for a time interval; and

(b) allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one file transmission[s] task may be allocated a different amount of the available bandwidth.

2. (Amended) The method of claim 1, which includes the step of initializing a bandwidth allocation scheduler prior to the determining step (a), comprising the steps of:

(a1) obtaining a plurality of system configuration parameters from a plurality of database tables;

(a2) initializing a global step function (GSF), wherein the GSF represents a total maximum bandwidth available in the network in the time interval for completion of the file transmission; and

(a3) subtracting from the GSF bandwidth requirements for a plurality of on-going [life] live-video stream (LVS) jobs and LVS jobs planned from a time of initialization to a maximum transmission duration.

4. (Amended) The method of claim 1, wherein the determining step (a) comprises the steps of:

(a1) updating a total available bandwidth for the time interval; and

(a2) checking for the available bandwidth for completion of the file transmission for the time interval.

7. (Amended) The method of claim 5, wherein the allocating step (a1ii) comprises the step of:

(a1iiA) subtracting from a GSF the bandwidth requirements for the plurality of LVS jobs, wherein the GSF represents a total maximum bandwidth available in the network in the time interval for completion of the file transmission.

8. (Amended) [The method of claim 5, wherein the checking step (a2) comprises the steps of:] A method for media delivery in a network, comprising the steps of:

(a) determining an available bandwidth for file transmission for a time interval, comprising the steps of:

(a1) updating a total available bandwidth for the time interval, comprising the

steps of:

(a1i) reading from a plurality of database tables a plurality of [LVS] jobs to begin during the time interval,

(a1ii) allocating bandwidth to the plurality of LVS jobs not yet allocated bandwidth, and

(a1iii) recording the allocated bandwidth to the plurality of LVS jobs in the plurality of database tables, and

(a2) checking for the available bandwidth for file transmission for the time interval, comprising the steps of:

(a2i) updating a GSF[;],

(a2ii) determining if enough bandwidth is available for file transmissions[;],

(a2iii) sending an indication if there is not enough bandwidth available for file transmission[;], and

(a2iv) finding a bandwidth strip which begins at a current time, fits under the GSF, has at least a minimum amount of bandwidth that must be allocated to a file transmission task, and does not extend, in the X/time-direction, beyond a latest delivery time (LDT) of the at least one transmission task; and

(b) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmissions task may be allocated a different amount of the available bandwidth[.].

10. (Amended) [The method of claim 1, wherein the allocating step (b) comprises the steps of:] A method for media delivery in a network, comprising the steps of:

(a) determining an available bandwidth for file transmission for a time interval; and

(b) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmissions task may be allocated a different amount of the available bandwidth, comprising the steps of:

(b1) setting an upper bound on an amount of bandwidth to a smaller of the available bandwidth and a maximum bit rate of a plurality of receivers[;],

(b2) gathering data for the at least one file transmission task, the gathered data including a size of the at least one file transmission task[;],

(b3) determining an allocation strategy selected by the customer[;],

(b4) computing an overhead for the at least one file transmission task[;],

(b5) allocating the portion of the available bandwidth based on the upper bound, the size of the at least one transmission task, the computed overhead, and the allocation strategy selected by the customer[;], and

(b6) recording the available bandwidth remaining after the allocation in a plurality of database tables.

14. (Amended) The method of claim 1, further comprising:

(c) freeing any allocated available bandwidth unused by a complete transmission of the at least one file transmission task.

15. (Amended) The method of claim 14, wherein the freeing step (c) comprises the steps of:

(c1) updating a global step function (GSF), wherein the GSF represents a total maximum bandwidth available in the network in the time interval for completion of the file transmission;

(c2) constructing a payback strip from the portion of the available bandwidth allocated to the at least one file transmission task;

(c3) adding the payback strip to the GSF; and

(c4) recording an available bandwidth remaining after the adding step ([d]c3) in a plurality of database tables.

16. (Amended) [The method of claim 15, wherein the constructing step (c2) comprises the steps of:] A method for media delivery in a network, comprising the steps of:

(a) determining an available bandwidth for file transmission for a time interval;

(b) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmissions task may be allocated a different amount of the available bandwidth; and

(c) freeing any allocated available bandwidth unused by a transmission of the at least one file transmission task, comprising the steps of:

(c1) updating a GSF, spelled out

(c2) constructing a payback strip from the portion of the available bandwidth allocated to the at least one file transmission task, comprising the steps of:

(c2i) finding an expiration time corresponding to the at least one file transmission task in the plurality of database tables[;], and

(c2ii) constructing the payback strip that extends in an X/time-direction until the expiration time and in a Y/bandwidth direction from zero to the portion of the available bandwidth allocated to the at least one file transmission task,

(c3) adding the payback strip to the GSF, and

(c4) recording an available bandwidth remaining after the adding step (c3) in a

plurality of database tables.

17. (Amended) The method of claim 1, wherein the at least one file transmission tasks [are] is scheduled back-to-back when duration of allocations are known when the allocations are made.

19. (Amended) A computer readable medium with program instructions for media delivery in a network, the instructions for:

(a) determining an available bandwidth for completion of a file transmission for a time interval; and

(b) allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth.

20. (Amended) The medium of claim 19, which includes instructions for initializing a bandwidth allocation scheduler prior to the determining instruction (a), comprising the instructions for:

(a1) obtaining a plurality of system configuration parameters from a plurality of database tables;

(a2) initializing a global step function (GSF), wherein the GSF represents a total maximum bandwidth available in the network in the time interval for completion of the file transmission; and

(a3) subtracting from the GSF bandwidth requirements for a plurality of on-going [life] live-video stream (LVS) jobs and LVS jobs planned from a time of initialization to a maximum

transmission duration.

22. (Amended) The medium of claim 19, wherein the determining instruction (a) comprises the instructions for:

(a1) updating a total available bandwidth for the time interval; and

(a2) checking for the available bandwidth for completion of the file transmission for the time interval.

25. (Amended) The medium of claim 23, wherein the allocating instruction (a1ii) comprises the instructions for:

(a1iiA) subtracting from a GSF the bandwidth requirements for the plurality of LVS jobs, wherein the GSF represents a total maximum bandwidth available in the network in the time interval for completion of the file transmission.

26. (Amended) [The medium of claim 23, wherein the checking instruction (a2) comprises the instructions for:] A computer readable medium with program instructions for media delivery in a network, the instructions for:

(a) determining an available bandwidth for file transmission for a time interval, comprising the instructions for:

(a1) updating a total available bandwidth for the time interval, comprising the instructions for:

(a1i) reading from a plurality of database tables a plurality of LVS jobs to begin during the time interval,

(a1ii) allocating bandwidth to the plurality of LVS jobs not yet allocated

spelled out

bandwidth, and

(a1iii) recording the allocated bandwidth to the plurality of LVS jobs in the plurality of database tables, and

(a2) checking for the available bandwidth for file transmission for the time interval, comprising the steps of:

(a2i) updating a GSF[;],

(a2ii) determining if enough bandwidth is available for file transmissions[;],

(a2iii) sending an indication if there is not enough bandwidth available for file transmission[;], and

(a2iv) finding a bandwidth strip which begins at a current time, fits under the GSF, has at least a minimum amount of bandwidth that must be allocated to a file transmission task, and does not extend, in the X/time-direction, beyond a LDT of the at least one transmission task; and

(b) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth.

28. (Amended) [The method of claim 19, wherein the allocating instruction (b) comprises the instructions for:] A computer readable medium with program instructions for media delivery in a network, the instructions for:

(a) determining an available bandwidth for file transmission for a time interval; and

(b) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmission task may be allocated a

different amount of the available bandwidth, comprising the instructions for:

(b1) setting an upper bound on an amount of bandwidth to a smaller of the available bandwidth and a maximum bit rate of a plurality of receivers[;],

(b2) gathering data for the at least one file transmission task, the gathered data including a size of the at least one file transmission task[;],

(b3) determining an allocation strategy selected by the customer[;],

(b4) computing an overhead for the at least one file transmission task[;],

(b5) allocating the portion of the available bandwidth based on the upper bound, the size of the at least one transmission task, the computed overhead, and the allocation strategy selected by the customer[;], and

(b6) recording the available bandwidth remaining after the allocation in a plurality of database tables.

32. (Amended) The medium of claim 19, further comprising instructions for:

(c) freeing any allocated available bandwidth unused by a complete transmission of the at least one file transmission task.

33. (Amended) The medium of claim 32, wherein the freeing instruction (c) comprises the instructions for:

(c1) updating a global step function (GSF), wherein the GSF represents a total maximum bandwidth available in the network in the time interval for completion of the file transmission;

(c2) constructing a payback strip from the portion of the available bandwidth allocated to the at least one file transmission task;

(c3) adding the payback strip to the GSF; and

(c4) recording an available bandwidth remaining after the adding step ([d]c3) in a plurality of database tables.

34. (Amended) [The medium of claim 33, wherein the constructing instruction (c2) comprises the instructions for:] A computer readable medium with program instructions for media delivery in a network, the instructions for:

(a) determining an available bandwidth for file transmission for a time interval;

(b) allocating at least a portion of the available bandwidth to at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth; and

(c) freeing any allocated available bandwidth unused by a transmission of the at least one file transmission task, comprising the instructions for:

(c1) updating a GSE, spelled out

(c2) constructing a payback strip from the portion of the available bandwidth allocated to the at least one file transmission task, comprising the instructions for:

(c2i) finding an expiration time corresponding to the at least one file transmission task in the plurality of database tables[;], and

(c2ii) constructing the payback strip that extends in an X/time-direction until the expiration time and in a Y/bandwidth direction from zero to the portion of the available bandwidth allocated to the at least one file transmission task,

(c3) adding the payback strip to the GSE, and

(c4) recording an available bandwidth remaining after the adding step (d3) in a plurality of database tables.

35. (Amended) The medium of claim 19, wherein the at least one file transmission tasks [are] is scheduled back-to-back when duration of allocations are known when the allocations are made.

37. (Amended) A method for media delivery in a network, comprising the steps of:

(a) initializing a global step function (GSF), wherein the GSF represents a total maximum bandwidth available in the network in a time interval for completion of a file transmission;

(b) updating the GSF based upon bandwidth requirements for a plurality of live-video stream (LVS) jobs for a time interval;

(c) determining a size of at least one file transmission task which can be completely transmitted during the time interval based upon the updated GSF; and

(d) allocating at least a portion of the updated GSF to complete the at least one file transmission task based upon the size and an allocation strategy, wherein each of the at least one transmission task may be allocated a different amount of bandwidth.

38. (Amended) A computer readable medium with program instructions for media delivery in a network, the instructions for:

(a) initializing a global step function (GSF), wherein the GSF represents a total maximum bandwidth available in the network in a time interval for completion of a file transmission;

(b) updating the GSF based upon bandwidth requirements for a plurality of live-video stream (LVS) jobs for a time interval;

(c) determining a size of at least one file transmission task which can be completely

transmitted during the time interval based upon the updated GSF; and

(d) allocating at least a portion of the updated GSF to complete the at least one file transmission task based upon the size and an allocation strategy, wherein each of the at least one transmission task may be allocated a different amount of bandwidth.

39. (Amended) A method for media delivery in a network, comprising the steps of:

(a) determining an available bandwidth for completion of a file transmission for each of a plurality of time intervals; and

(b) allocating at least a portion of the available bandwidth to complete at least one file transmission task for each time interval, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth , wherein the at least one file transmission tasks for each time interval are scheduled back-to-back.

40. (Amended) A computer readable medium with program instructions for media delivery in a network, the instructions for:

(a) determining an available bandwidth for completion of a file transmission for each of a plurality of time intervals; and

(b) allocating at least a portion of the available bandwidth to complete at least one file transmission task for each time interval, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth, wherein the at least one file transmission tasks for each time interval are scheduled back-to-back.

41. (Amended) A method for media delivery in a network, comprising the steps of:

(a) determining an available bandwidth for completion of a file transmission for a

time interval; and

(b) allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth, wherein the allocated available bandwidth varies as a polynomial in time.

42. (Amended) A computer readable medium with program instructions for media delivery in a network, the instructions for:

(a) determining an available bandwidth for completion of a file transmission for a time interval; and

(b) allocating at least a portion of the available bandwidth to complete at least one file transmission task, wherein each of the at least one file transmission task may be allocated a different amount of the available bandwidth, wherein the allocated available bandwidth varies as a polynomial in time.

43. (Amended) A system, comprising:

a server, comprising a manager for file transmissions via a satellite transponder, wherein the manager comprises a bandwidth allocation scheduler, the bandwidth allocation scheduler capable of determining an available bandwidth for completion of a file transmission for a time interval, and allocation at least a portion of the available bandwidth to complete at least one file transmission task, wherein [allocating] a different amount of an available bandwidth to each of a plurality of file transmission tasks; and

a database table coupled to the server, comprising information required by the manager for file transmissions.

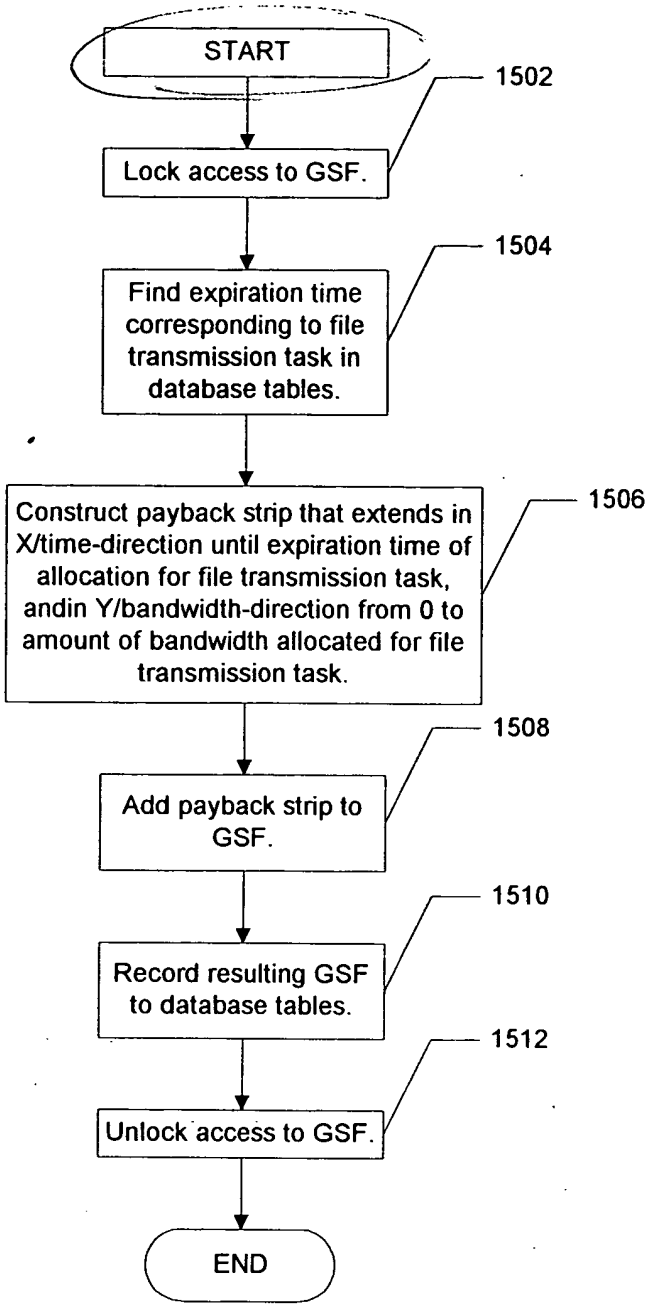


FIGURE 15

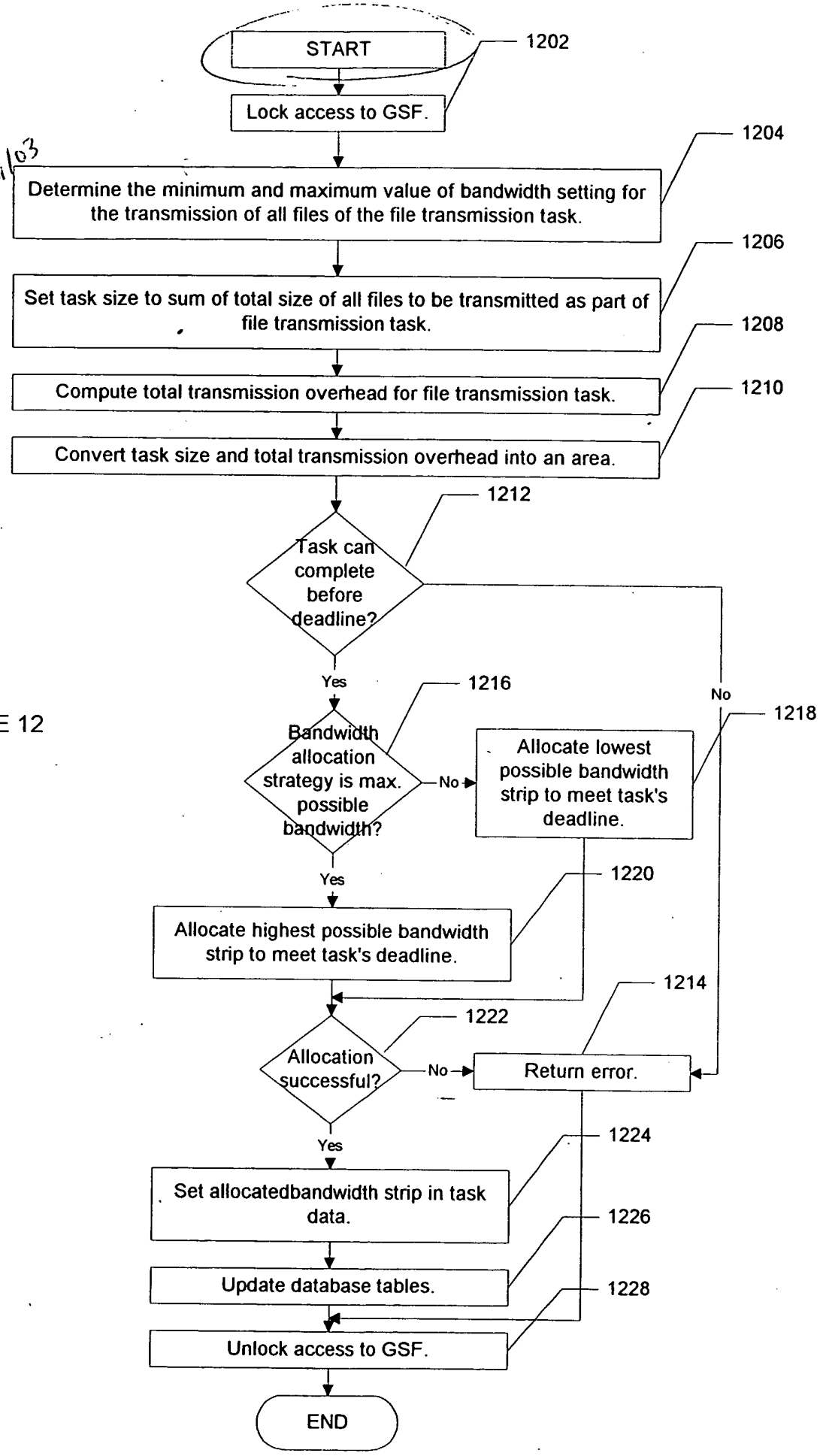


FIGURE 12

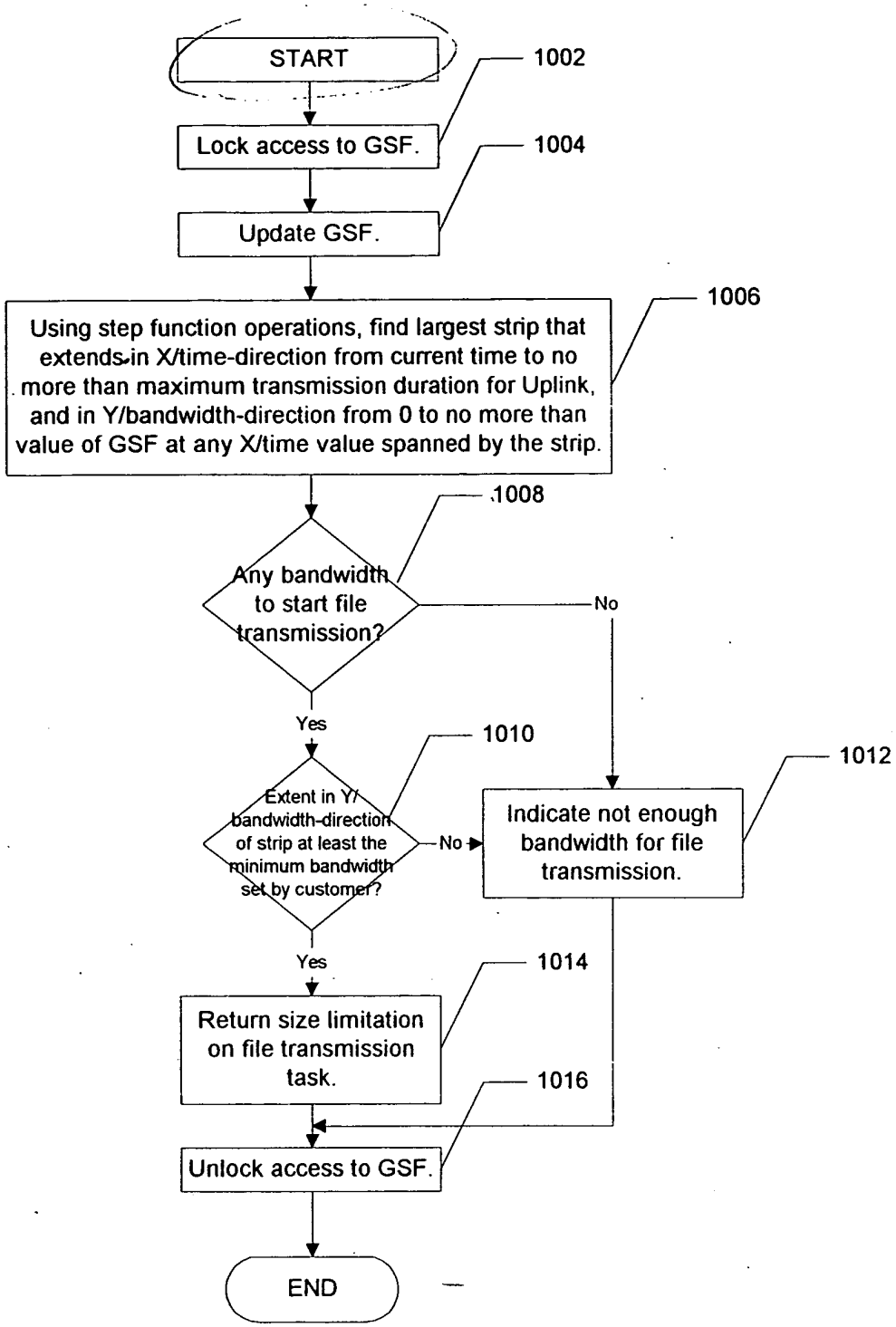


FIGURE 10

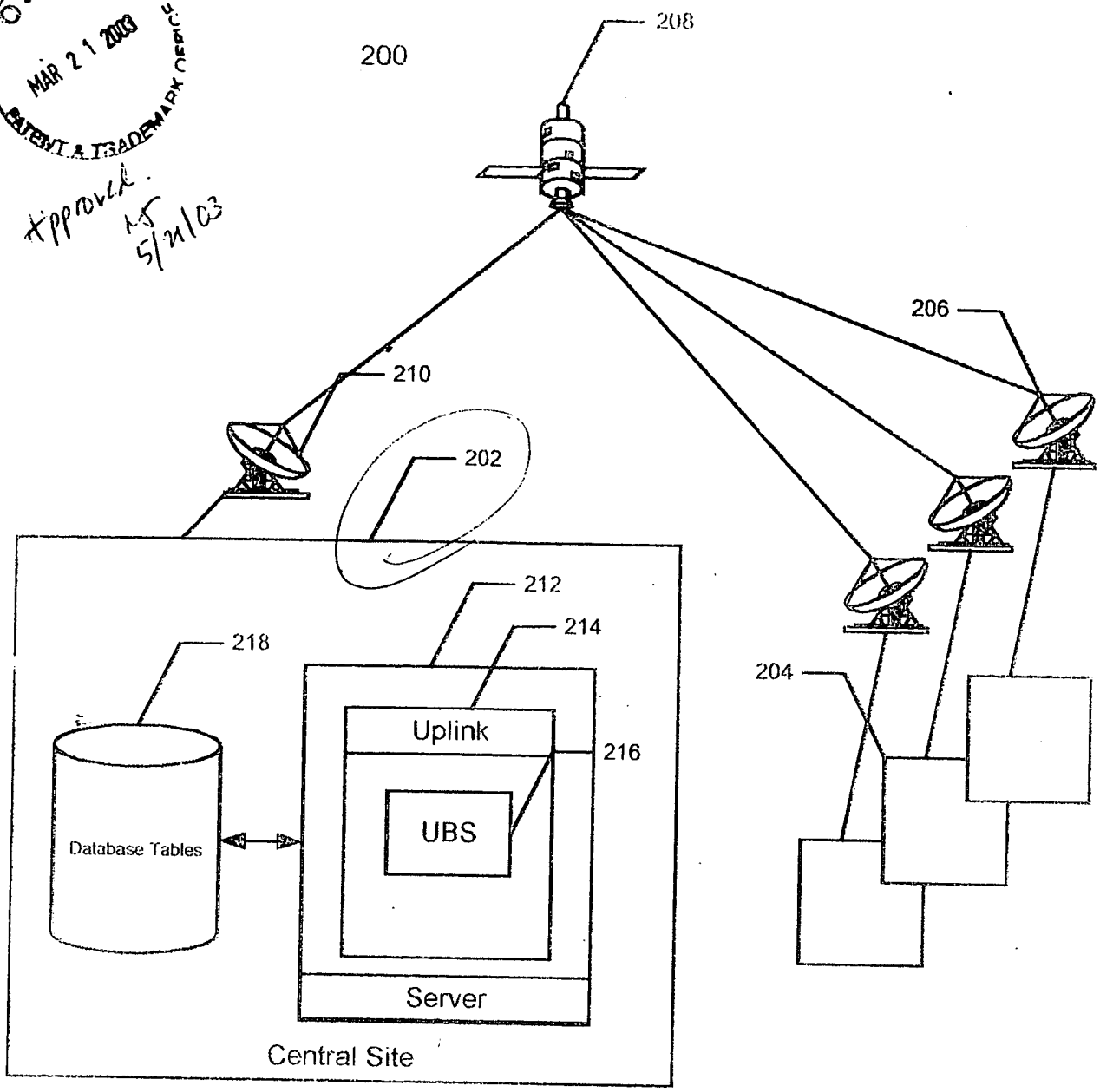


FIGURE 2B